



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 7
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AWMD/RCAP

MEMORANDUM

SUBJECT: Review of Human Health Risk Assessment for the Occidental Chemical Corporation Facility, Wichita, Kansas

FROM: Greg McCabe
ENST/EDAB

TO: Bradley Roberts
AWMD/WRAP/RCAP

We have completed our review of the *Human Health Risk Assessment for the Occidental Chemical Corporation Facility*, dated September 3, 2015. To supplement our review, we also read several other reports provided to us for background information: *On-Site Vapor Intrusion Investigation, Assessment, and Interim Corrective Measures Implementation*, dated September, 2009; *Operation and Maintenance Plan for On-Site Vapor Intrusion Interim Corrective Measures at the Control Laboratory, Technical Center and Administration Building*, dated December 2010; *On-Site Vapor Intrusion Mitigation Interim Corrective Measures Construction Completion Report*, dated May 2011; *Supplemental Quarterly Off-Site Monitoring Soil Gas Monitoring Summary Report*, dated October, 2010; and, *Supplemental Quarterly Off-Site Soil Gas Monitoring Summary Report, Revision 1*, dated January 2011. However, the focus of our review was the Human Health Risk Assessment report. Based on our review, we have the following comments:

General Comments

1. Page 1 of the HHRA states that "The vapor intrusion pathway will not be evaluated within this HHRA. A work plan to evaluate the potential for vapor intrusion will be submitted under separate cover..." The exclusion of such a significant exposure pathway makes the current HHRA incomplete, because not all relevant exposure pathways have been assessed. We have several specific concerns regarding the lack of inclusion of the vapor intrusion pathway:

- a. Because the locations of nearby residences are not on any figures included in the Risk Assessment, we compared satellite photos of the area with the plumes pictured in Figures 6-15. It appears to us that several residences are either directly over, or directly downgradient, of several of the plumes of contamination.

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b. Pages 11 and 13 state that the Supplemental Quarterly Off-Site Soil Gas Monitoring Summary Report indicated that there were no unacceptable risks for off-site residences. However, that report does not indicate that any sub-slab or indoor air samples were taken at the residences mentioned. Rather, soil gas probes located “near” (“near” is undefined) the residences were used in the evaluation of vapor intrusion potential. There are no figures included in the report which show the locations of the plumes, residences or the soil gas sampling locations. Soil gas was apparently sampled at depths of 15 and 25 feet below ground surface, but no rationale is provided for why those depths were selected, or how they relate to the vapor intrusion pathway.

c. The on-site vapor intrusion investigation report from 2009 discusses the vapor intrusion investigation which took place at three on-site buildings, as well as the building depressurization system which is apparently being used as a vapor intrusion mitigation system. Although it is not our intention to recommend revision of the document, we would like to point out several issues which, if they were to be included in a current risk assessment today, would result in our not accepting that risk assessment as being adequate:

1) As noted in our specific comments, EPA regulations require that baseline risk assessments be completed assuming the absence of institutional controls (e.g., in this case, the building depressurization system).

2) Page 11 reports that sub-slab soil gas exposure point concentrations were derived using the 95% UCL of the mean. Typically, we do not derive 95% UCLs for sub-slab gases in a vapor intrusion risk assessment. Generally, maximum values are used, instead. The RSL for TCE, in particular, is based on short-term inhalation exposures which could be underestimated by a 95% UCL of the mean.

3) The Johnson and Ettinger model was used to estimate indoor air concentrations. We no longer use the J&E model. Rather, we rely on EPA’s final vapor intrusion guidance (EPA, 2015), and the default attenuation factors found therein, for the estimation of indoor air concentrations.

4) Perhaps most significantly, there appear to have been no indoor air samples taken as part of the vapor intrusion investigation. Simple reliance on estimated indoor air concentrations, as was done in the 2009 document, is considered unacceptable. The 2009 report documents extremely high concentrations of volatile contaminants in the sub-slab gases. Given these high concentrations, we would recommend indoor air sampling, as well as concurrent sub-slab sampling, be conducted at the facility as soon as possible, to verify that any indoor air concentrations of contaminants resulting from vapor intrusion are not exceeding health-based levels. The following table presents some, but not all, of the sub-slab sampling results, as well as indoor air concentrations estimated using the default attenuation factor of 0.03, as recommended in EPA’s final vapor intrusion guidance. These estimated indoor air concentrations can be compared with EPA’s commercial/industrial screening levels, found in the last column of the table. These health-based screening levels are based on a potential excess cancer risk of $1 \text{E-}06$ and an $\text{HI} = 1$ (where noted), assuming EPA default exposure factors. These screening levels can be found at: <http://www2.epa.gov/risk/regional-screening-table>. All concentrations are in units of $\mu\text{g}/\text{m}^3$:

Building	Compound	Sub-Slab Gas Concentration	Estimated Indoor Air Concentration	EPA Screening Levels
Control Laboratory	Carbon tetrachloride	1400	42	2
	Chloroform	3,000	90	0.53
	PCE	4,200	126	47
	TCE	520	15.6	8.8*
Technical Center	Benzene	190	5.7	1.6
	Carbon tetrachloride	10,000,000	300,000	2
	Chloroform	1,200,000	36,000	0.53
	1,1-DCA	53,000	1,590	7.7
	1,1-DCE	58,000	1,740	880 ⁺
	1,2-Dichloropropane	42,000	1,260	1.2
	Ethylbenzene	240	7.2	4.9
	Hexachlorobutadiene	240	7.2	0.56
	PCE	1,600,000	48,000	47
	TCE	60,000	1,800	8.8*
Administration Building	Carbon tetrachloride	3,800,000	114,000	2
	Chloroform	540,000	16,200	0.53
	PCE	450,000	13,500	47
	TCE	5,400	162	8.8*

* The TCE screening value is based on short-term non-carcinogenic effects on unborn fetuses. It is treated as a “not to exceed” value by EPA. Region 7 typically recommends installation of vapor mitigation systems anytime that the TCE screening level is exceeded in indoor air.

⁺ RSL is based on noncancer value of HI=1.

As shown in the table, using EPA’s default attenuation factor of 0.03, the estimated indoor air concentrations are far greater than EPA’s health-based screening levels. This does not necessarily mean that the actual indoor air concentrations are as high as those estimated. However, because no indoor air samples were taken during the vapor intrusion investigation, it is not possible for us to determine what the indoor air concentrations actually are. It is possible that the building depressurization system is keeping contaminants from reaching these concentrations indoors. But we could find nothing in the reports we looked at which suggested that there were any plans to monitor the indoor air after the building depressurization system was operational, in order to verify that that system was effective in mitigating potential vapor intrusion impacts. These results are especially concerning if elevated concentrations of contaminants are found in sub-slab gases beneath spaces where office workers would be expected to work.

2. We could find no figures which identified the exact location of downgradient residences. All downgradient residences within at least two miles of the facility should be located on a map or

maps which also identify the extent of the groundwater contamination plumes. That would enable the reader to determine how close each residence was to each of the contamination plumes.

3. The Conceptual Site Models shown in Figures 17 – 19 depict on-site worker exposure pathways, only. A CSM for off-site residences should also be included in the HHRA.

Specific Comments

1. Section 2.2, page 3. The text states that “the land use will be deed restricted to industrial/commercial use...” What is the current status of any such deed restrictions, and what restrictions are, or have been, included?

2. Section 4.1, page 9. Where exactly is the DNAPL plume located, and what contaminants have been identified in that plume? The location of that plume, including the horizontal and vertical extent, should be clearly identified in a figure or figures.

3. Section 4.3, page 11. The text needs to provide more detailed information regarding the potential for residential use of groundwater as a potable water supply. For example, which residents are currently using private domestic wells for their water supply? Which residents have private domestic wells available for use, if they so choose? What are the depths of those wells? What were the results of any off-site residential well sampling events?

4. Section 4.4, page 12. The text states that “The indoor inhalation pathway is incomplete for these buildings due to the positive pressure maintained within the occupied space”. Based on our understanding, no indoor air samples have been taken with the buildings, thus we cannot determine whether or not a complete vapor intrusion pathway exists. Also, EPA regulations require that baseline risk assessments assume the absence of institutional controls. Thus, any risk assessment which evaluates worker inhalation exposure must assume that building pressurization practices are not in operation.

5. Section 4.4, page 13. Limiting a maintenance worker exposure in the Landfill Area to 2 or 3 days per year seems unreasonably restrictive. Typically, mowing and other landscaping and maintenance activities would be expected at least throughout the growing season. EPA guidance recommends a default exposure frequency of 225 days per year for outdoor workers. What is the rationale, and supporting documentation, for limiting expected maintenance worker activities in the Landfill Area to only 2 or 3 days per year?

6. Section 4.4, page 13. The text states that groundwater is not currently used for potable purposes by off-site residences, and is not expected to be so in the future. Where exactly do off-site residences obtain their potable water? Why is future use of groundwater not expected to be a possibility in the future? What documentation exists to support this statement? Please see specific comment 3.

Reference

U.S. EPA. 2015. OSWER Technical Guide For Assessing And Mitigating the Vapor Intrusion Pathway From Subsurface Vapor Sources to Indoor Air. OSWER 9200.2-154. Office of Solid Waste and Emergency Response, Washington, D.C.